APPENDIX A

US006293039B1

(12) **United States Patent**
Fuchs

(10) **Patent No.: US 6,293,039 B1**
(45) **Date of Patent: Sep. 25, 2001**

(54) **PISTOL WITH LOCKING MECHANISM**

(75) Inventor: **Rudolf Fuchs**, Thayngen (CH)

(73) Assignee: **SIG Arms International AG** (CH)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/246,050**

(22) Filed: **Feb. 8, 1999**

(30) **Foreign Application Priority Data**

Feb. 10, 1998 (DE) 198 05 306

(51) **Int. Cl.**[7] **F41A 17/04**
(52) **U.S. Cl.** **42/70.11**; 42/70.07; 42/70.04
(58) **Field of Search** 42/70.11, 70.01, 42/70.05, 70.07, 70.08, 70.04

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,735,519	*	5/1973	Fox	42/70.04
4,457,091		7/1984	Wallerstein	42/1 LP
4,467,545	*	8/1984	Shaw, Jr.	42/70 R
4,739,569		4/1988	Battle	42/1.01
4,970,819		11/1990	Mayhak	42/70.01
5,022,175		6/1991	Oncke et al.	42/70.11
5,062,232		11/1991	Eppler	42/70.11
5,448,847	*	9/1995	Teetzel	42/70.06
5,461,812	*	10/1995	Bennett	42/70.06
5,502,915		4/1996	Mendelsohn et al.	42/70.11
5,560,135	*	10/1996	Ciluffo	42/70.07
5,603,179	*	2/1997	Adams	42/70.08
5,636,464		6/1997	Ciluffo	42/70.11
5,946,841	*	9/1999	Roper	42/70.07

FOREIGN PATENT DOCUMENTS

4303333	6/1994	(DE)	F41A/17/06

* cited by examiner

Primary Examiner—J. Woodrow Eldred
(74) *Attorney, Agent, or Firm*—Webb Ziesenheim Logsdon Orkin & Hanson, P.C.

(57) **ABSTRACT**

A pistol has a locking mechanism that locks the trigger mechanism of the pistol if an unauthorized person attempts to fire the pistol. The locking mechanism includes an identification unit to detect an identification signal and a control unit that compares the inputted signal with a stored identification pattern. An electromechanical actuator device actuates a locking element that can be moved into a locked position and into an unlocked position, which in the locked position locks the trigger tongue of the pistol. The pistol locking mechanism has a plurality of display elements that display the operating status of the locking mechanism.

19 Claims, 2 Drawing Sheets

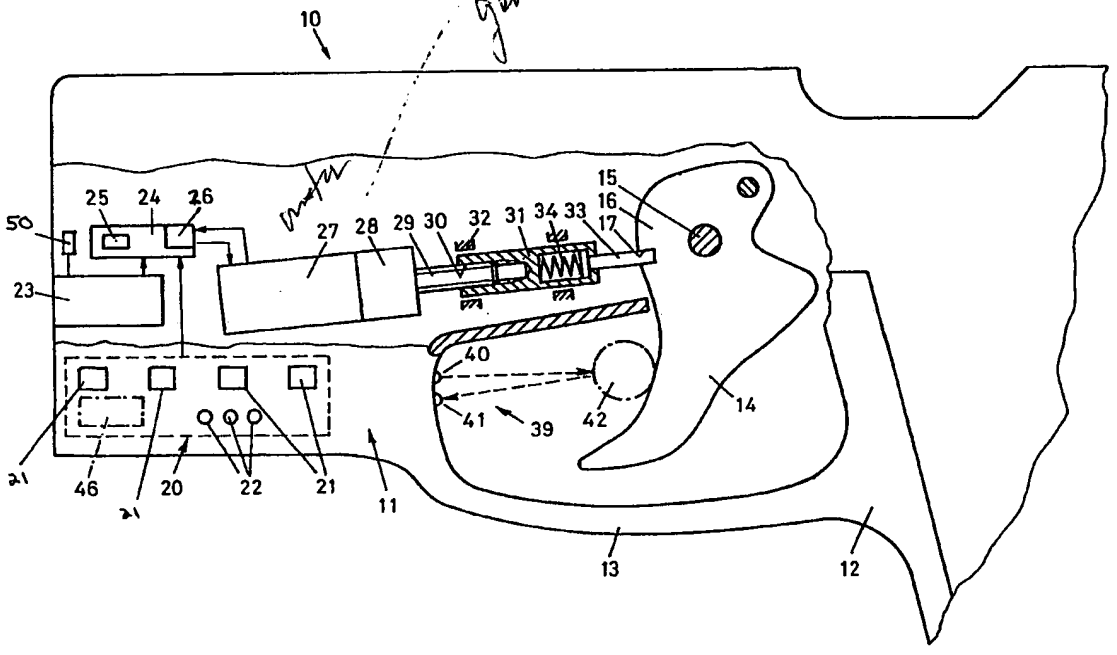


Fig. 1

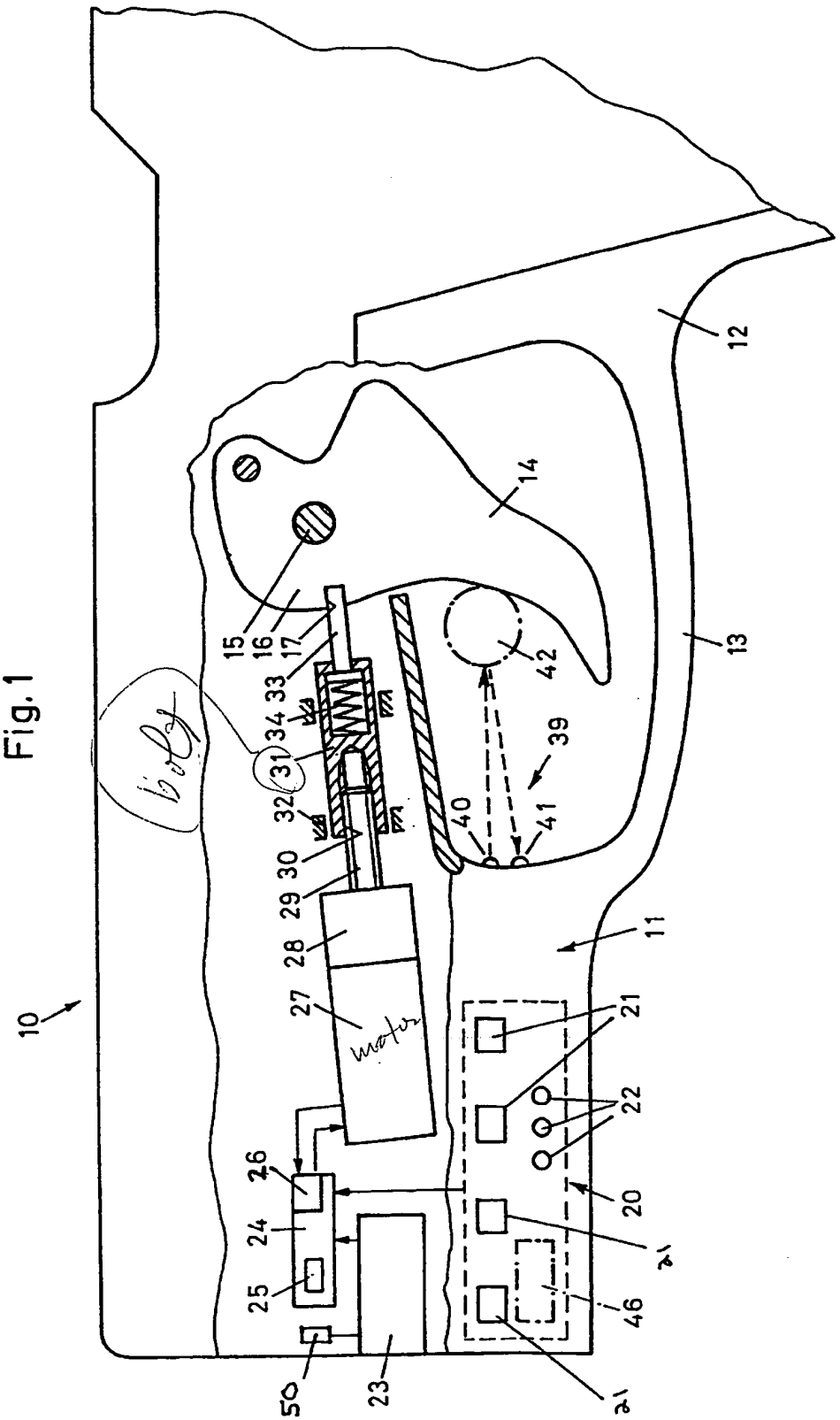

10
11
12
13
14
15
16
17
21
22
20
21
21
23
24
25
26
27
28
29
30
31
32
33
34
39
40
41
42
46
50
body
motor

Fig. 2

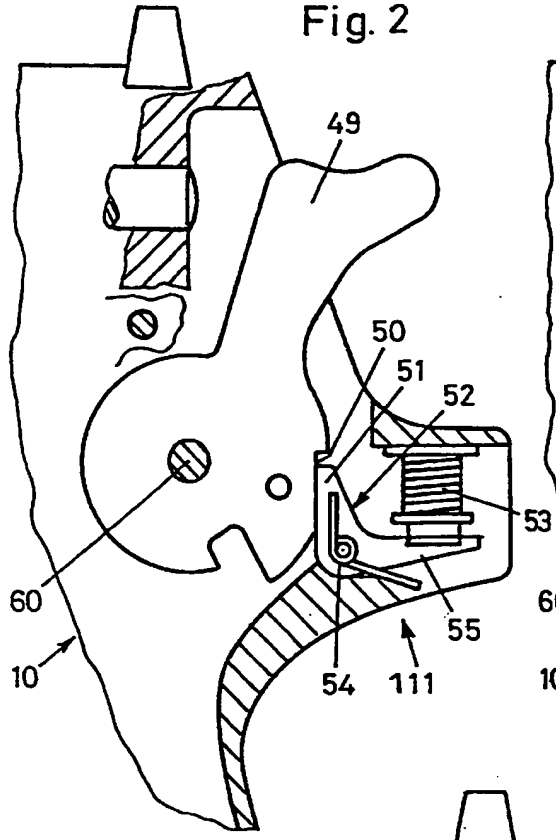


Fig. 3

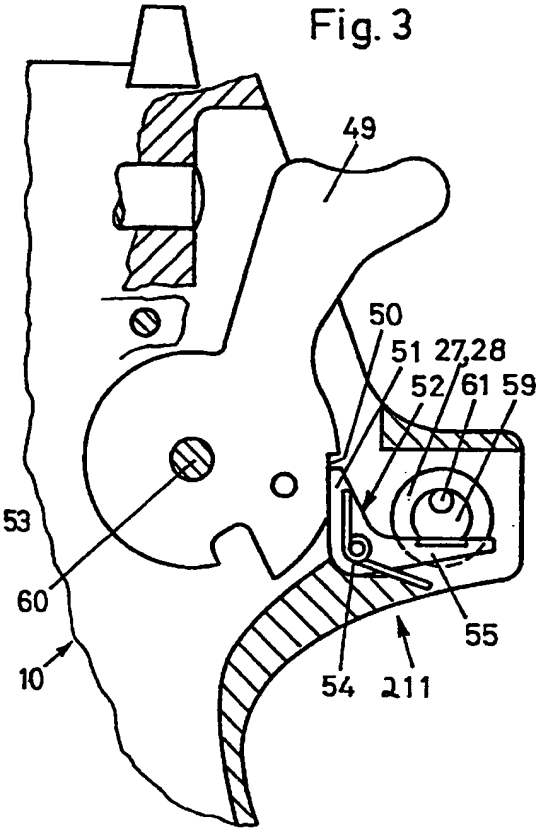
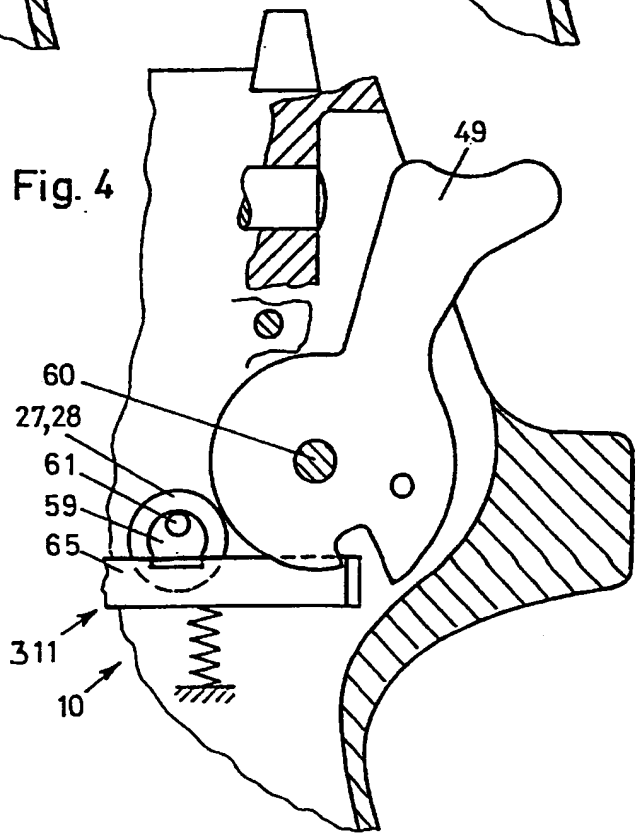


Fig. 4



PISTOL WITH LOCKING MECHANISM

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to handguns and, more particularly, to a pistol having a locking mechanism to lock and unlock the pistol trigger mechanism.

2. Description of the Currently Available Technology

U.S. Pat. No. 5,502,915 describes a revolver that includes a locking device that blocks the hammer if an attempt to operate the revolver is made by an unauthorized person. The device has a scanner on the revolver grip that identifies the palm print of the shooter and compares it to a pattern stored in memory. If the scanned print matches the print stored in memory, the hammer is unlocked by a solenoid so that the weapon is ready for firing. However, this solution cannot be used on most automatic pistols since the magazine must be inserted into the pistol grip and, therefore, there would be no room for the locking device.

Additional locking devices for handguns that can be fired only by authorized users are described in DE-A-43 03 333 and U.S. Pat. Nos. 5,603,179; 5,022,175; and 4,970,819.

Therefore, it is an object of the invention to create a locking mechanism for a pistol, e.g., an automatic pistol, that locks the trigger mechanism of the pistol if an unauthorized person attempts to fire the pistol. The invention teaches that this object can be accomplished by the features disclosed hereinbelow.

SUMMARY OF THE INVENTION

A pistol locking mechanism is provided for reversibly locking the trigger mechanism of a pistol if an attempt is made by an unauthorized person to fire the pistol. The locking mechanism comprises an identification unit to detect an identification signal; a control unit connected with the identification unit that compares the inputted signal with a stored identification code or number; an actuator device having a motor, e.g., a geared motor, connected to the control unit which is connected, e.g., by a threaded spindle-nut connection, with a mechanical locking element movable between a locked position locking the trigger tongue of the pistol and an unlocked position; a battery is preferably present to supply power to the locking mechanism; and a plurality of display elements to display the operating status of the locking mechanism.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is explained in greater detail below with reference to the exemplary embodiments illustrated in the accompanying drawings, in which:

FIG. 1 shows a schematic side view of a first embodiment of the invention in partial section, and

FIGS. 2 to 4 show partial sections of three additional exemplary embodiments of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

For purposes of the description hereinafter, spacial terms such as "left", "right", etc. shall relate to the invention as it is oriented in the Figures. However, it is to be understood that the invention may assume various alternative variations, except where expressly specified to the contrary.

FIG. 1 is a schematic illustration showing in partial section a detail of a side view of a pistol **10** with a locking mechanism **11** of the invention. The pistol **10** has a grip body **12** with a molded trigger guard **13** into which a trigger tongue **14** projects. The tongue **14** is rotationally mounted on a cross pin **15** and actuates a trigger rail (not shown) in conventional manner. The front of the tongue **14** has an approximately cylindrical part **16** that runs concentric to the pin **15** and has an index notch **17**. The locking mechanism **11** is preferably installed below the barrel and for the most part in front of the trigger guard **13**.

The mechanism **11** comprises an identification unit **20** having a keypad with a plurality, e.g., four, keys **21**. One key, e.g., the first or rightmost key, can be used to electronically enter signals, e.g., numbers, e.g., 1, 2 or 3 by pressing it once, twice or three times, respectively. The next two keys **21** can be used to enter or code the numbers 4 to 6 and 7 to 9, respectively. The fourth or leftmost key **21** can be used to enter the number 0 and to select the functions "reset" and "save". The mechanism **11** is preferably initially turned on by pressing any key. Pressing the fourth key **21** (reset) twice locks the trigger tongue **14** and switches the electronic system to standby. The keys **21** can be used to enter a user personal identification number (PIN) code or alphanumeric code. The user can also select the length of time the pistol will remain unlocked. After the expiration of the unlocked period or when the pistol is deactivated, the trigger mechanism is locked automatically. The identification unit **20** is in electronic communication, e.g., by wires or electronic circuit, with a power source, e.g., a battery **23**, to supply electrical power to the identification source **20**. The battery **23** is also in electronic communication with a charge monitoring unit **50** for monitoring the charge remaining in the battery.

The identification unit **20** preferably has three light-emitting diodes **22** of different colors to indicate the operating status of the mechanism **11**. For example, one diode **22** lights when the mechanism **11** is activated and the trigger tongue **14** is locked. The second diode **22** lights when the trigger tongue **14** is unlocked. The third diode lights when the battery **23** needs to be replaced, because its charge is almost depleted. In the absence of a timely response to this signal, before the battery **23** is fully discharged and depending on the application in which the pistol is being used, the mechanism **11** switches either to lock the trigger tongue **14** (for civilian use) or to unlock the trigger tongue **14** for an unlimited period of time (for police use) when the battery power drops below a preset, specified value.

The identification unit **20** is in electronic communication with a control unit **24** having an electronic memory **25** which stores the code that must be entered to unlock the trigger tongue **14**, The control unit **24** compares the code that has just been inputted into the identification unit **20** with the code stored in the memory **25**. If the codes match, the control unit **24** actuates an actuator device, e.g., an electric motor **27**, via an electronic control system **26**. The battery **23** is also in electronic communication with the control unit **24** and motor **27** to supply electrical power to these elements. In a preferred embodiment, the motor **27**, via a planetary reduction gear train **28**, drives a threaded spindle **29** that is screwed into a nut thread **30** of a prismatic bolt **31**. The bolt **31** is guided in guides **32** so that it can move longitudinally but non-rotationally. A locking element **33** is movably mounted in the bolt **31**. The locking element **34** is biased toward the tongue **14** by a spring **34**. When the tongue **14** is in a base position and the mechanism **11** is in the locked position, the locking element **33** is engaged in the notch **17** and locks the trigger tongue **14** to prevent movement of the trigger tongue **14**.

If an authorized user or shooter wishes to fire the pistol **10**, he first turns on the mechanism **11** by pressing one of the keys **21** and then enters his PIN code via the keys **21**. The inputted code is compared by the control unit **24** to the code stored in memory **25** and, if the two codes are the same, the bolt **31** is retracted from the illustrated locked position, e.g., right most position in FIG. **1**, by the motor **27** so that the locking element **33** is retracted from the notch **17** to release the trigger tongue **14**, i.e., allow the trigger tongue **14** to rotate.

In addition, an infrared sensor **39** with an infrared emitter **40** and a receiver **41** can be installed on the front end of the trigger guard **13** and powered in conventional manner by the battery **23**. The sensor **39** is in electronic communication with the control unit **24** and releases the control unit **24** to unlock the pistol **10** only if, before the code is entered via the keys **21**, one of the shooter's fingers **42** is engaged in the trigger guard **13**. When the shooter's finger **42** is removed from the trigger guard **13**, the signal from the sensor **39** brings about an automatic locking of the pistol **10** by the control unit **24**. Therefore if the pistol **10** falls out of the shooter's hand or is taken from him, the trigger tongue **14** is locked automatically.

Instead of the keys **21**, or in addition to them, the identification unit **20** can also include a fingerprint scanner **46**. In that case, the memory **25** stores the pattern of a fingerprint, for right-handed shooters, for example, the tip of the index finger of the left hand. The scanned fingerprint is compared to the pattern stored in the unit **24** and, if the two prints match, the locking mechanism **11** is unlocked, i.e., the locking element **33** is withdrawn from the notch **17**. This variant has the advantage of easier and faster operation. The identification is also accurate, reliable and secure, and relates to only one individual.

FIGS. **2** to **4** illustrate additional embodiments of the invention, whereby the elements **20** to **26** and/or **46** can be realized in a manner that is identical to the elements of the embodiment illustrated in FIG. **1**. In the embodiments illustrated in FIGS. **2** and **3**, a hammer **49** is locked by a locking mechanism **111**. For that purpose, the hammer **49** has an index notch **50**, in which, in the locked position, one, e.g., a first, arm **51** of a spring-loaded, two-armed locking lever **52** is engaged. In the mechanism **111** illustrated in FIG. **2**, the lever **52** can be pivoted into the unlocked position by a solenoid **53** against the force of a spring **54**. The solenoid **53** is configured to engage a second arm **55** of the lever **52**. A capacitor is preferably installed in the electronic control system **26**. The electronic control system **26** (FIG. **1**) actuates the solenoid **53** in conventional manner, such that when the solenoid **53** is activated, the lever **52** rotates clockwise as shown in FIG. **2** so that the first arm **51** is rotated out of the notch **50** to allow the hammer **49** to be cocked.

In a locking mechanism **211** embodiment illustrated in FIG. **3**, the solenoid **53** of FIG. **2** is replaced by a geared motor **27** and gear train **28** as shown in FIG. **1** having an output shaft **59** oriented substantially parallel to an axis of rotation **60** of the hammer **49**. The output shaft **59** supports an eccentric pin **61**. In the unlocked position, the pin **61** presses on the second arm **55** to rotate the first arm **51** out of the notch **50**. This variant has the advantage that current is required only to switch from the locked position into the unlocked position and vice-versa. The shaft **59** thereby rotates by 1800 during each operation.

A locking mechanism **311** variant illustrated in FIG. **4** is analogous to the one illustrated in FIG. **3**. In this case, in the locked position, the eccentric pin **61** pushes a spring-loaded trigger rail **65** out of engagement with the hammer **49** to allow the hammer **49** to be cocked.

Having described the presently preferred embodiments of the invention, it is to be understood that the invention may be otherwise embodied within the scope of the appended claims.

I claim:

1. A pistol having a locking mechanism configured to lock a trigger mechanism of the pistol if an attempt is made by an unauthorized person to fire the pistol, the locking mechanism comprising:

an identification unit configured to detect an identification signal inputted into the identification unit;

a control unit connected to the identification unit, the control unit configured to compare the signal inputted into the identification unit with a stored identification code;

an actuator device including a geared motor connected to the control unit and connected by a threaded spindle and nut connection with a mechanical locking element which is movable between a locked position and an unlocked position, wherein in the locked position the locking element locks a trigger tongue of the pistol;

a battery for supplying electrical power to the locking mechanism; and

a plurality of display elements configured to display an operating status of the locking mechanism.

2. A pistol as claimed in claim **1**, wherein the locking element is configured to engage a notch in the trigger tongue, and wherein the locking element is guided for movement in a bolt and is spring-loaded.

3. The pistol as claimed in claim **1**, wherein at least the greater portion of the locking mechanism is located in front of a trigger guard and below the barrel of the pistol.

4. The pistol as claimed in claim **1**, wherein the identification unit comprises a keypad for the input of the code.

5. The pistol as claimed in claim **1**, wherein the identification unit comprises a finger-print scanner.

6. The pistol as claimed in claim **1**, wherein located in front of a trigger tongue in a trigger guard of the pistol there is an infrared sensor in electronic communication with the identification unit and configured to automatically switch the actuator device into the locked position when no finger is engaged in the trigger guard.

7. The pistol as claimed in claim **1**, wherein after release of the locking element, the locking element is configured to automatically move back into the locked position after one of a plurality of preselected periods of time.

8. A pistol as claimed in claim **1**, wherein the locking mechanism contains a charge monitoring unit for monitoring the charge remaining in the battery, wherein this charge is indicated by one of the display elements, and wherein the locking element automatically switches into the locked position or into the unlocked position when the battery charge drops below a specified value.

9. The pistol as claimed in claim **2**, wherein at least the greater portion of the locking mechanism is located in front of a trigger guard and below the barrel of the pistol.

10. The pistol as claimed in claim **2**, wherein the identification unit comprises a keypad for the input of the code.

11. The pistol as claimed in claim **3**, wherein the identification unit comprises a keypad for the input of the code.

12. The pistol as claimed in claim **2**, wherein the identification unit comprises a finger-print-scanner.

13. The pistol as claimed in claim **3**, wherein the identification unit comprises a finger-print scanner.

14. The pistol as claimed in claim 4, wherein the identification unit comprises a finger-print scanner.

15. The pistol as claimed in claim 2, wherein located in front of a trigger tongue in a trigger guard of the pistol there is an infrared sensor in electronic communication with the identification unit and configured to automatically switch the actuator device into the locked position when no finger is engaged in the trigger guard.

16. The pistol as claimed in claim 3, wherein located in front of a trigger tongue in a trigger guard of the pistol there is an infrared sensor in electronic communication with the identification unit and configured to automatically switch the actuator device into the locked position when no finger is engaged in the trigger guard.

17. The pistol as claimed in claim 4, wherein located in front of a trigger tongue in a trigger guard of the pistol there is an infrared sensor in electronic communication with the identification unit and configured to automatically switch the actuator device into the locked position when no finger is engaged in the trigger guard.

18. The pistol as claimed in claim 5, wherein located in front of a trigger tongue in a trigger guard of the pistol there is an infrared sensor in electronic communication with the identification unit and configured to automatically switch the actuator device into the locked position when no finger is engaged in the trigger guard.

19. The pistol as claimed in claim 2, wherein after release of the locking element, the locking element is configured to automatically move back into the locked position after one of a plurality of preselected periods of time.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 6,293,039 B1
DATED : September 25, 2001
INVENTOR(S) : Rudolf Fuchs

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 2,
Line 50, after "trigger 14" delete comma and insert period -- . --.

Column 3,
Line 64, "by 1800" should read -- by 180° --.

Column 4, claim 12,
Line 65, "finger-print-scanner" should read -- finger-print scanner --.

Signed and Sealed this

Nineteenth Day of March, 2002

Attest:

Attesting Officer

JAMES E. ROGAN
Director of the United States Patent and Trademark Office

FAX COVER SHEET

Electronic Information Center
Scientific and Technical Information Center
United States Patent and Trademark Office
2121 Crystal Drive, Room 3C03
Arlington, Virginia 22202
FAX: 703-305-5443/ PHONE: 703-305-4071,
703-306-0255

TO:	**FROM:**	
ORG:	**PAGES:**	**(including cover sheet)**
FAX:	**DATE:**	

Message

Mr. Jonkins

RE 09/270,461, This art reads into claims 15-16.

Mathi

2-4-03